Ocular Trauma

Joyce H. Cassen MD, PhD
Assistant Clinical Professor, John A. Burns School of Medicine

Summary: *A review of the literature was conducted to investigate recent articles about ocular trauma. Eye injuries may be divided into blunt and penetrating types. Males are more affected than females. Evaluation of eye injuries should start with visual acuity and continue with prompt referral to an ophthalmologist as indicated.*
Design: *Medlines search/American Academy of Ophthalmology*
Results: *Ocular trauma is a frequent reason for emergency room visits. Most injuries stem from sports, recreation, military, occupational, or automotive.*
Discussion: *Patient education is highly recommended, as well as prevention by use of protective polycarbonate eyewear.*

Introduction

Eye injuries from blunt trauma, penetrating forces, burns, or irritating compounds may cause ophthalmic morbidity.[1] Ocular trauma is a frequent reason for emergency room visits.[2] Common eye injuries occur from sports, recreation, military, occupational fields such as carpentry and construction, or automotive, to name several major areas. Injuries may occur to the orbit and ocular adnexa, cornea, sclera, uveal tract, retina, and optic nerve. An international standardized classification[3] of ocular trauma has been developed and endorsed by several institutions, including the International Society of Ocular Trauma, the U.S. Eye Injury Registry, the American Academy of Ophthalmology, and the Retina Society. Males have more ocular injuries than females. In Hawaii, especially, surfing injuries to the eye and ocular adnexa are common in young males and may be devastating. Evaluation should be prompt.[4] Measurement of the visual acuity of the eye is the best way to start, to determine initial severity of the damage, followed by complete eye exam. A report may be filed to the U.S. Eye Injury Registry for tabulation of ocular injuries nationwide.

Table 1.—Clinical Diagnosis at Presentation

Initial Diagnosis	No.	%
Lids and orbit	45	53.6
Lids/and orbital contusion	39	46.4
Lid laceration	7	8.3
Orbital fracture	2	2.4
Conjunctiva	16	19.0
Subconjuctival hemorrhage	14	16.6
Conjunctival laceration	2	2.4
Cornea	16	19.0
Corneal abrasion	16	19.0
Corneal laceration	1	1.2
Corneoscleral laceration	1	1.2
Anterior chamber	58	69.0
Uveitis	32	38.0
Hyphema	45	53.6
Glaucoma, secondary	24	28.6
Iris laceration or dialysis	3	3.6
Extraocular muscle	2	2.4
Third nerve paresis	1	1.2
Fourth nerve paresis	1	1.2
Vitreous and retina	37	44.0
Vitreous hemorrhage	18	21.4
Retinal hemorrhage	24	28.6
Retinal edema	12	14.3
Macular edema	5	6.0
Macular hemorrhage	3	3.6
Retinal dialysis	2	2.4
Retinal detachment (rhegmatogenous)	3	3.6
Choroidal hemorrhage	2	2.4

Blunt trauma

Sports

In a report by Filipe et al[5], it was noted that most sports ocular injuries occurred predominantly in young males, with mean age of 25 years old. These were primarily blunt injuries from soccer, baseball, squash, and racquet balls. Hyphema, vitreous hemorrhage, *commotio retinae*, and retinal detachment occurred. Angle recession glaucoma was significantly higher in cases of hyphema. Retinal tears were more common in the presence of vitreous hemorrhage. The U.S. Eye Injury Registry report forms were useful for collecting data on injuries. Clinical diagnosis at presentation of injuries was based on 84 consecutive cases (See Table 1). With eye protection, 90% of sports eye injuries are preventable.

In Hawaii, aside from ball injuries, surfing accounts for a multitude of recreational trauma, especially from the fin of the surfboard. Eyelid lacerations (See Figs. 1 and 2), scleral laceration, hyphema, traumatic cataract, lens dislocation, glaucoma, retinal pathology, optic nerve severing, and extraocular muscle shearing have been reported locally. Many of these cases require several ophthalmologic subspecialists to surgically rehabilitate the injured eye.

Automotive

Auto accidents represent high-velocity blunt trauma. Recently, air-bags have gained acceptance in vehicular safety. A review of air bag-related ocular trauma was carried out by Ghafouri et al.[6] A total of 11 accidents with 32 patients and 39 eyes were reviewed. The most common type of eye injury was to the eyelids (28 eyes), conjunctiva (25 eyes), and the cornea (28 eyes). Hyphema was seen in 11 eyes. Serious cases of vision-threatening injury included retinal dialysis, detachment, dislocated lens with cataract, and scleral rupture. Patients were 55% women, and 45% men. Age ranged from 2 - 81 (mean age 36). Damage to the right eye occupied in 35% of cases while 38% to the left eye and 27% bilateral. These findings indicate that further refinement in air-bag design is needed.

Fig. 1.—Eye lid Laceration from Surfboard

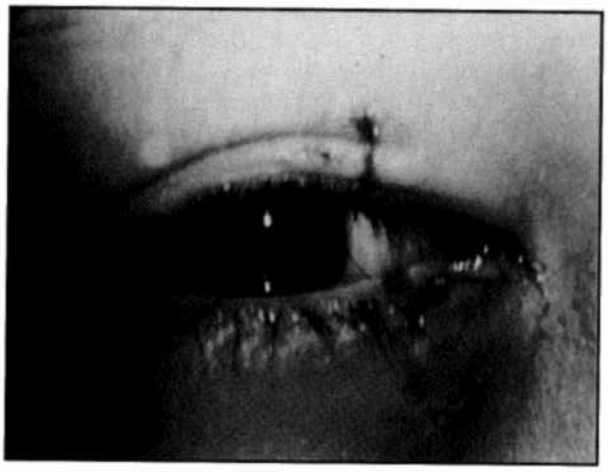

Fig. 2.—3 Months Post-Repair

Table 2.—Associated Ocular Injuries

	Anterior	Epibulbar	Posterior
Total	13	4	10
Conjunctiva/cornea			
Subconjunctival hemorrhage, corneal abrasion, injection, chemosis	6	4	8
Anterior chamber			
Hyphema	1	1	2
Iritis	2	1	1
Posterior segment			
Commotio	3	1	4
Retinal/vitreous hemorrhage	4	2	3
RD/retinal tear/ sclopetaria/ choroidal rupture	2	1	4
Decreased motility	1	2	7
Open globe	0	0	2
Afferent pupillary defect			
Traumatic optic neuropathy	1	1	7
Fracture	3	1	4

RD = retinal detachment.

Penetrating Trauma

Foreign bodies

Projectile metallic foreign bodies in the orbit such as BB's, bullets, shot, and miscellaneous fragments have all been reported in the orbit and eye. Finkelstein et al[7] reviewed 27 orbital cases in 7 years preceding, and found the majority of patients male, between age 11-30, and had BB pellets in the orbit. Thirteen of 27 cases were anterior, 4 equatorial, and 10 posterior. Not all BB's were felt necessary to remove if they were in a remote area of the orbit. Final visual acuity was improved on discharge.

Greater ocular morbidity is associated with intraocular foreign bodies. Pathology may include corneal abrasion, laceration of the globe, traumatic cataract, retinal detachment, and the like (See Table 2). Tomic[8] reviewed 40 cases of intraocular foreign bodies which were evaluated and surgically treated. The group was mainly males with average age of 33 years. In these cases 92% of the foreign bodies were metallic. After a one month follow-up, 70% of eyes achieved good post-op vision. Metallic foreign bodies may be removed with a sterile surgical magnet in some cases, where the intraocular foreign body is anterior to the retina. In cases where the penetrating trauma has left an eye with no light perception, it may be necessary to remove the traumatized eye to avoid sympathetic ophthalmia. In these cases, a second ophthalmic opinion is required in most hospital settings.

Education and protective eye wear (safety goggles) are useful in reducing projectile ocular injuries.

Fireworks

In a firecracker study[9], 316 children were treated for injuries. Of these cases 95% were injured between June 22 - July 14 over a 22 year period. The average age was 8.5 years, with a range of 1 month to 17 years old. Eyes were injured in 29% of cases: 15% of children required surgery and 10% had permanent sequelae. The authors felt that public fireworks performed professionally were reasonable, however that private fireworks should be banned.

Dog bites

Dog bites account for canalicular injuries in conjunction with facial lacerations. In 17 dog bite-induced canalicular injuries,[10] all were treated with antibiotics and surgical repair. Prophylaxis of canine oral flora needs to be considered in these cases.

Military

Battlefield injuries of the eye and orbit can cause severe ocular morbidity and incapacitate military personnel.[11] Most penetrating eye injuries may be from shrapnel, bullets, or debris. Any trauma on the battlefield requires prompt diagnosis, coupled with indicated treatment and evacuation from the war zone. Often care is administered in a mobile unit initially.

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Irritating compounds/Burns

Super glue

Ocular injury from super glue may present to the office or emergency room. In a study[12] of 14 patients over a one month period, there were no long term complications from the super glue injury. Eyelid closure and conjunctival and corneal abrasions may occur. Treatment includes removal of super glue by cutting it off from eyelashes, to allow the patient to open the eye. The glue may be allowed to slough off on its own if there is no diminution of sight. Local treatment for corneal abrasion may be indicated, including usage of topical antibiotics.

Chemicals

Cleaning compounds and other toxic fluids may contain acids or bases. These should be copiously rinsed from the eye, and topical antibiotics applied. Follow-up with an ophthalmologist is recommended.

Burns

Ocular burns may be from toxic chemicals or from prolonged sun/UV exposure. Topical therapy is generally adequate, with conjunctival and corneal epithelium restoring itself within several days. Pain control may be required, according to the severity of the burn.

Conclusion

Traumatic eye injuries require careful evaluation. Initial evaluation should be to check the visual acuity and patch the eye for protection until consultation. Superficial injuries may be treated by a generalist or emergency room. However, any severe ocular injury should be promptly referred to an ophthalmologist. The American Academy of Ophthalmology recommends protective polycarbonate eye wear for prevention of eye injuries.

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